

U.S. Pat App. No. 10/813,829
Amendment A in response to
Office Action mailed 06/27/2006
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Atty Dkt No. LMRX-P037/P1258

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1.-34. (Cancelled)

35. (New) A method for selecting an endpoint indicator in plasma processing, the method comprising:

providing a least one frequency;

etching at least one sample substrate using the at least one frequency;

determining at least one calibrating endpoint by performing an empirical analysis on the at least one sample substrate;

etching at least one test substrate using the at least one frequency, the at least one test substrate being etched beyond the at least one calibrating endpoint;

measuring at least one parameter over at least one time range when etching the at least one test substrate, the at least one time range including the at least one calibrating endpoint;

comparing data pertaining to a plurality of harmonics for the at least one parameter, the data pertaining to the at least one calibrating endpoint; and

selecting the endpoint indicator based on the comparing, the endpoint indicator including a harmonic for a parameter from the plurality of harmonics for the at least one parameter.

36. (New) The method of claim 35 wherein the endpoint indicator is the harmonic for the parameter, the endpoint indicator to be used for the plasma processing at a given frequency of the at least one frequency.

37. (New) The method of claim 35 wherein the endpoint indicator further includes a frequency from the at least one frequency, the frequency to be used for the plasma processing.

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38. (New) The method of claim 35 wherein the wherein the empirical analysis includes a scanning electron microscopy analysis.
39. (New) The method of claim 35 wherein the at least one parameter includes at least one of current, voltage, and phase.
40. (New) The method of claim 35 wherein the data include sensitivities of the plurality of harmonics for the at least one parameter, the sensitivities pertaining to the at least one calibrating endpoint.
41. (New) The method of claim 35 wherein the at least one parameter is measured at one or more of an upper electrode and a lower electrode of a system for the plasma processing.
42. (New) The method of claim 35 wherein the at least one parameter is measured at both of an upper electrode and a lower electrode of a system for the plasma processing.
43. (New) The method of claim 35 wherein the at least one frequency includes a plurality of frequencies.
44. (New) The method of claim 35 further comprising verifying the endpoint indicator by performing a further empirical analysis.
45. (New) A method for detecting an endpoint in plasma processing at a given frequency, the method comprising:
- etching a sample substrate at the given frequency;
 - determining a calibrating endpoint by performing an empirical analysis on an etched location of the sample substrate;
 - etching at least one test substrate at the given frequency, the at least one test substrate being etched beyond the calibrating endpoint;
 - measuring at least one parameter over a time range when processing the at least one test substrate, the time range including the calibrating endpoint;

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comparing data pertaining to a plurality of harmonics for the at least one parameter,
the data pertaining to the calibrating endpoint;

selecting a harmonic for a parameter from the plurality of harmonics for the at least
one parameter as an endpoint indicator based on the comparing;

setting at least one criterion pertaining to the harmonic for the parameter for
indicating the endpoint;

etching a production substrate at the given frequency;

monitoring the harmonic for the parameter when etching the production substrate; and
signaling the endpoint when the at least one criterion is met.

46. (New) The method of claim 45 wherein the at least one parameter includes at least
one of current, voltage, and phase.

47. (New) The method of claim 45 wherein the at least one criterion includes presence of
a trough in a waveform of the harmonic for the parameter.

48. (New) The method of claim 45 wherein the monitoring includes measuring the
parameter at one or more of an upper electrode and a lower electrode of a system for the
plasma processing.

49. (New) The method of claim 45 wherein the monitoring includes measuring the
parameter at both of an upper electrode and a lower electrode of a system for the plasma
processing.